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NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD

MILITARY AGENCY FOR STANDARDIZATION (MAS)
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See Distribution List: STANAG AC/112 (PHEWG)

STANAG 3609 ILCEP (EDITION 3)(AMENDMENT 4) - STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS

Reference:
MAS(AIR)149-IF&L/3609 dated 13 June 1994 (Edition 3)

1. The subject STANAG was promulgated by the document at reference. Addressees are requested to destroy the existing pages iii/iv of the STANAG and substitute the revised ones attached.

2. AAP-4 should be amended to reflect the latest status of the STANAG.

A. GRØNHEIM
Major General, NOAF
Chairman MAS

Enclosure:
Revised ratification/implementation details

NORTH ATLANTIC TREATY ORGANIZATION
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1/6/96

24 APR 1996

MAS(AIR)142-PHE/3609

22 April 1996

To : See Distribution List Air B

Subject : STANAG 3609 PHE (EDITION 3)(AMENDMENT 3) - STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS

Reference : MAS(AIR)149-PHE/3609 dated 13 June 1994 (Edition 3)

Enclosure : Revised ratification/implementation details

1. The subject STANAG was promulgated by the document at reference. Addressees are requested to destroy the existing page iii/iv of the STANAG and substitute the revised ones attached.

2. AAP-4 should be amended to reflect the latest status of the STANAG.

G.B. FERRARI
Major-General, ITAF
Chairman, MAS

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AIR142

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NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD

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Rec: 5 May 95 MA

MAS(AIR)76-PHE/3609
3 May 1995

To : See Distribution List Air B

Subject : STANAG 3609 PHE (EDITION 3)(AMENDMENT 2) - STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS

Reference : MAS(AIR)149-PHE/3609 dated 13 June 1994 (Edition 3)

Enclosure : Revised pages 1/2, A-1/2 and A-3/4

1. The subject STANAG was promulgated by the document at reference. Addressees are requested to amend the STANAG by destroying the existing pages 1/2, A-1/2 and A-3/4 and substitute the revised versions attached.

2. AAP-4 should be amended to reflect the latest status of the STANAG.

3. The Air Board, MAS, considers this an editorial amendment to the STANAG; previous ratifying references and implementation details are deemed to be valid.

G.B. FERRARI
Major-General, ITAF
Chairman, MAS

33-pb

NATO UNCLASSIFIED

NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD

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MAS(AIR)427-PHE/3609
20 December 1994

To : See Distribution List Air B

Subject : STANAG 3609 PHE (EDITION 3)(AMENDMENT 1) - STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS

Reference : MAS(AIR)149-PHE/3609 dated 13 June 1994 (Edition 3)

Enclosure : Revised ratification/implementation details

1. The subject STANAG was promulgated by the document at reference. Addressees are requested to destroy the existing page iii/iv of the STANAG and substitute the revised one attached.

2. AAP-4 should be amended to reflect the latest status of the STANAG.

G.B. FERRARI
Major-General, ITAF
Chairman, MAS

33-FB

NATO UNCLASSIFIED

NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD

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MAS(AIR)149-PHE/3609

13 June 1994

To : See Distribution List Air B

Subject : STANAG 3609 PHE (EDITION 3) - STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS

References :
a. MAS(AIR)667-PHE/3609 dated 28 January 1988 (Edition 2)
b. MAS(AIR)320-PHE/3609 dated 13 September 1993 (Edition 3)(1st Draft)

Enclosure : STANAG 3609 (Edition 3)

1. The enclosed NATO Standardization Agreement which has been ratified by nations as reflected in page iii is promulgated herewith.

2. The references listed above are to be destroyed in accordance with local document destruction procedures.

3. AAP-4 should be amended to reflect the latest status of the STANAG.

ACTION BY NATIONAL STAFFS

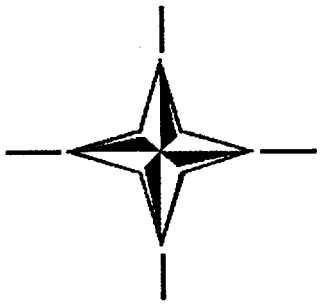
4. National staffs are requested to examine page iii of the STANAG and if they have not already done so, to advise the Air Board, MAS, through their national delegation as appropriate of their intention regarding its ratification and implementation.

G.B. FERRARI
Major-General, ITAF
Chairman, MAS

33-pb/FB

STANAG No. 3609
(Edition 3)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)



MILITARY AGENCY FOR STANDARDIZATION
(MAS)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS

Promulgated on 13 June 1994

G.B. FERRARI
Major-General, ITAF
Chairman, MAS

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature
1	427-PHE/3609, 20 Dec 94	26 JAN 95	

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Chairman MAS under the authority vested in him by the NATO Military Committee.

2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "The declaration by which a nation formally accepts the content of this Standardization Agreement".

5. Implementation is "The fulfilment by a nation of its obligations under this Standardization Agreement".

6. Reservation is "The stated qualification by a nation which describes that part of this Standardization Agreement which it cannot implement or can implement only with limitations".

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page iii gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page iv (and subsequent) gives details of reservations and proprietary rights that have been stated.

Agreed English/French texts

STANAG 3609
(Edition 3)

NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT (STANAG)

STANDARDS FOR MAINTENANCE OF FIXED AVIATION FUEL, RECEIPT, STORAGE AND DISPENSING SYSTEMS

Annexes:
- A. Description, Definitions and Terminology for Fixed Jet Fuel Storage Installations
- B. Required Preventive and Field Maintenance Services and Inspections
- C. Guidance for Frequency of Periodic Inspections and Maintenance Services
- D. Guidance for Entry, Inspection, Cleaning and Repair of Jet Fuel Storage Tanks

Related Documents:

STANAG 1135 F&L -	INTERCHANGEABILITY OF FUELS, LUBRICANTS AND ASSOCIATED PRODUCTS USED BY THE ARMED FORCES OF THE NORTH ATLANTIC TREATY NATIONS
STANAG 3149 F&L -	MINIMUM QUALITY SURVEILLANCE OF PETROLEUM PRODUCTS
STANAG 3583 PHE -	STANDARDS OF ACCURACY FOR DIFFERENTIAL PRESSURE GAUGES FOR AVIATION FUEL FILTERS AND FILTER SEPARATOR VESSELS
STANAG 3681 PHE -	CRITERIA FOR PRESSURE FUELLING/DEFUELLING OF AIRCRAFT
STANAG 3747 F&L -	GUIDE SPECIFICATIONS (MINIMUM QUALITY STANDARDS) FOR AVIATION TURBINE FUELS (F-34, F-35, F-40 AND F-44)
STANAG 3756 PHE -	FACILITIES AND EQUIPMENT FOR RECEIPT AND DELIVERY OF LIQUID FUELS
STANAG 3967 PHE -	DESIGN AND PERFORMANCE REQUIREMENTS FOR AVIATION FUEL FILTER SEPARATOR VESSELS AND COALESCER AND SEPARATOR ELEMENTS
SHAPE 6160/18-6-176/64 -	MAINTENANCE OF NATO COMMON INFRASTRUCTURE AIRFIELDS

AIM

1. The aim of this agreement is to establish minimum maintenance standards for fixed Jet Fuel Storage Installations (JFSIs) used by NATO nations.

AGREEMENT

2. Participating nations agree the conditions laid down in paragraphs 3-4 below.

GENERAL

3. Each nation shall establish standards for maintenance of its fixed JFSIs and perform inspections and periodic maintenance based on the guidelines in Annexes A-D.

4. National regulations shall include the following requirements for maintenance of on-base facilities to ensure these facilities are in a reliable condition to meet the assigned military mission:

a. Perform scheduled maintenance inspections and prompt remedial action on deficiencies.

b. Maintain written records of inspections.

c. Provide definitive written procedures for preventive and field maintenance.

d. Keep system areas free from fire and explosion hazards.

e. Inspect bulk and operating storage tanks as required to determine the need for cleaning and repair.

f. Perform periodic pressure checks on piping.

g. Perform maintenance functions on filter/separator vessels.

h. Identify systems by the use of NATO markings.

i. Follow environmental protection requirements when system maintenance is performed.

IMPLEMENTATION OF THE AGREEMENT

5. This STANAG is implemented when a nation has issued the necessary orders/instructions to the forces concerned putting the procedures detailed in this STANAG into effect.

ANNEX A TO
STANAG 3609
(Edition 3)

DESCRIPTION, DEFINITIONS AND TERMINOLOGY FOR FIXED JET FUEL STORAGE INSTALLATIONS

GENERAL

1. Fuel Specifications. Fuel specifications are contained in STANAGs 3747 and 1135. Proper maintenance of fuel systems assures a product's specification is maintained throughout an on-base distribution system.

2. Pressure and Flow Rate. The required operating pressure and flow rate of a fuelling installation is dependent upon the type of system and aircraft using the fuel.

a. Standard truck fill facilities vertical pumps require a minimum amount of pressure at the pump discharge point in order to assure proper functioning of all installed control valves. Flow rate at the dispensing point should normally be 2000 l/min but not less than 1000 l/min.

b. Aircraft hydrant type refuelling systems require higher operating pressures than truck fill stand systems due to the longer pipeline dispensing loops.

c. Maintenance personnel must ensure that the established pressure and flow of the facility is maintained.

(1) Low pressures may cause malfunctioning of control equipment and insufficient fuel flow.

(2) High overpressure may cause damage to equipment and generate increased shock and surges within a system.

3. Spare Parts. A stock of system spare parts, in accordance with SHAPE criteria, shall be retained on base to guard against possible system shutdown for lack of parts. For standard facilities using interchangeable major components, more and different spares could be stored under the NATO 90-day spare parts requirements, since a lesser number of (costly) major equipment items is needed. A number of standard facilities at several airfields could be combined into a geographical-logistic support area.

PERSONNEL

4. Training. Proper maintenance of fuelling installations requires thorough training of maintenance personnel, to include familiarization with the functioning of the installed equipment and courses on major equipment items. Furthermore, personnel must be made familiar with the hazards of handling jet fuels. It is essential that installed explosion-proof electrical equipment is not tampered with or repaired by unauthorized personnel, making the operation unsafe.

5. Health. Maintenance personnel should receive training to ensure that their health is not jeopardized when working around fuelling systems where spillages could occur and fuel vapours could be inhaled in enclosed areas (pump houses, filter/manifold stations, underground pits and underground storage tanks). Continual contact with fuel product could generate medical implications.

FACILITIES

6. Description. The JFSIs and components described in this STANAG are in accordance with the technical guidance for design and construction contained in NATO documents AC/4-M/24 and STANAG 3784.

7. Receiving. Fuel is received from off-shore tanker unloading; marine docks (piers, wharves, quays); pipeline terminals connected to on-base storage receiving tanks; railcar off-loading manifolds; tank truck off-loading points and additive injection stations.

8. Bulk Storage. Bulk storage tanks receive fuel by the various methods described above and are normally used to transfer fuel into operating tanks.

9. Transfer. Fuel shall be transferred by pumps or pump stations bulk tanks via the on-base pipeline system to storage areas dispersed over the airfield. Many airfields also have the ability to transfer fuel from a pipeline terminal point via a pre-filtration station, directly into operational storage areas, utilizing the off-base pipeline pumping pressure.

10. Operational Storage. Operating storage tanks receive fuel from bulk storage areas or pipelines and, in isolated cases, from trucks. Operating tanks are normally constructed underground and include the "cut and cover" type and are used for dispensing fuel into refuellers or directly into aircraft. The facility has a filter/manifold station where fuel passes at the receiving point through an inlet filter/separator and at the dispensing side through an issue filter/separator. Normally a drain tank for fuel recovery from pump-out of storage tanks and filter/separator is provided with each standard operational storage facility.

11. Dispensing. NATO airfields for tactical aircraft mission support are provided with splinter protected dispensing points for pumping fuel into refueller trucks. Airfields for special tactical aircraft and wide body aircraft are provided with hydrant type refuelling systems. A few bases in NATO are equipped with nationally funded in-shelter refuelling and some with hot pit refuelling from which tactical aircraft can be refuelled directly without refueller trucks.

12. Environmental Protection System. Standardized JFSIs are provided with fuel spill protection around dispensing points to prevent spilled fuel entering the soil and ground water. The inside of underground concrete dispensing pits, interior floors and walls, up to one meter height of pump houses and filter/manifold stations, are coated with a fuel resistant epoxy paint. To prevent fuel leakages penetrating the concrete into the earth, secondary containment and leak detection systems are provided for storage tanks.

EQUIPMENT

13. Tank Accessories. Standard storage tanks are provided with level indicators, pressure-vacuum valves, gauge pipes, high level shut-off valves, low level control switch and alarms.

14. Pumps. Various types of fuelling pumps are in use. Vertical underground storage tanks are provided with multi-stage, submersible, centrifugal pumps, installed on top of the tank; side-mounted tank installations are provided with multi-stage, horizontal, centrifugal pumps. Some horizontal storage tanks are equipped with floor-mounted rotary gear pumps. Following is a description of the pump's safety components:

a. Multi-stage, submersible, centrifugal pumps are normally provided with the following safety equipment.

(1) A flame-proof foot valve flanged on the suction flange to avoid a flame-break-through into the tank.

(2) A surrounding vessel guarantees liquid around the pump, even on an empty tank. Therefore, ignition of explosive gas mixtures in the tank by overheated pump parts is prevented.

(3) A small bypass-pipe from the motor bearing lantern, through the dome cover back to the tank bottom, effects a constant minimum discharge of fuel which prevents warming-up of the pump fluid, even when operating against a closed discharge valve.

(4) A small leakage reverse pipe between the mechanical seal housing and the tank bottom prevents leakage into the open (in the pump room) in case of seal failure.

(5) A flow detector, mounted on the discharge flange of the pump, switches off the pump in case of no flow or if the discharge volume falls short of the required minimum.

b. Multi-stage, horizontal, self-priming centrifugal pumps and rotary gear pumps are normally provided with an air bleed stage on the pressure-side. For shaft sealing a metal-bellows mechanical seal is commonly used. A flow detector is mounted on the discharge flange (as for the vertical pump).

c. Single stage, self-priming, side channel pumps with flow detectors are normally provided for a standard horizontal drain tank.

15. Control Valves. Control valves are used in the truck filling facilities and aircraft fuelling systems and consist of the following types:

a. Automatic control valves for standard truck fuelling systems.

(1) Operating tank high level control valve.

(2) Drain tank high level control valve.

(3) Pump discharge control valve.

(4) Filter/separator rate of flow control valve.

(5) Overpressure control valve.

(6) Filter/separator bypass control valve.

(7) Tank truck loading valve.

b. Types of automatic control valve for aircraft fuelling systems are:

(1) As in paragraph 15.a.(1) - (7) plus:

(2) Emergency shut-off valve.

(3) Back-pressure control valve.

(4) Refuelling control valves with venturi control for use in hydrant pits, (hot) refuelling pits and inside aircraft shelters.

16. Filter/Separators. Horizontal and vertical filter/ separators are in use with filter elements of varying sizes. STANAG 3967 provides design and performance requirements for these vessels. The following is a description of the types of filter/separator and their components:

a. The majority of fuelling systems built since 1970 are equipped with horizontal filter/separator units.

b. A number of vertical filter/separator units are in use in existing systems which require additional maintenance and special safety precautions during element replacement.

c. Major standard components of filter/separators are:

(1) Vessel, normally with internally coated carbon steel, stainless steel or aluminum.

(2) 1st stage coalescer elements.

(3) 2nd stage separating elements.

(4) Water sump with sight glass level indicator and float control valve with automatic drain valve.

(5) Automatic air vent valve (float operated).

(6) Piston type differential pressure gauge.

(7) Automatic fuel control valve with shut-down device in case of high water level in sump.

(8) Pressure relief valve.

17. Pipe and Accessories. Underground carbon steel and stainless steel pipes are normally provided with an external coating system. Following is a listing of pipes and accessories:

a. Piping. Carbon steel is normally used between the fuel receiving point and operating storage tank and between the operating storage tank and the inlet flange of the issue filter/separators. Stainless steel piping is normally used between the issue filter/separators and the truck fuel dispensing points and aircraft hydrant pits.

b. Accessories are as follows:

(1) Gate valves: normally with a rising stem used as maintenance (isolation) valves.

(2) Ball valves: normally for frequent operation and quick opening or closing.

(3) Flow meters, pressure gauges, safety devices, sampling devices, pressure/vacuum breather valves, tank level indicators.

(4) Strainers: normally in a vertical, cylindrical housing, equipped with a differential pressure gauge, and a cover with a lifting/swinging device; the strainer inserts are either basket or cartridge type.

18. Vehicle and Aircraft Connections. The truck filling and hydrant dispensing points are provided with the following types of dispensing equipment:

a. A truck filling point is normally provided with either a mechanical swivel type loading arm ("pantograph") of corrosion resistant metal or a flexible rubber hose.

b. Aircraft dispensing points are normally provided with either swivelling mechanical loading arms ("pantographs"), which may be fixed or detachable, or with conventional hoses and couplings, or portable hose carts.

19. Ventilation Equipment. A roof-top ventilator is normally used to remove hazardous fuel vapours by venting rooms, such as tank pump houses and filter/manifold stations. A pipe ventilator is normally used to remove hazardous fuel vapours from deep pits.

ELECTRICAL SYSTEMS

20. In a standardized JFSI the power distribution panel, control panel and standby generator are normally located in separate rooms of the filter/manifold station. Alternatively the electric power supply, control equipment and generator may be located in separate buildings.

21. Power Supply. A JFSI's primary power is supplied from the on-base electrical network and the emergency supply from a standby Diesel generator. Both sources are provided with power switches, which are interlocked to prevent simultaneous switch-on.

22. Stand-by Electric Power. Diesel generators of 100 kva are normally provided; larger capacity generators may be installed where required.

23. Switch Gear. The power distribution panel with all required switch gear should normally be of a module type design for easy maintenance, trouble-shooting and repair.

24. Solid State Systems. In JFSIs constructed since the early 1980's, the control panels for the operation of the entire facility are normally solid state systems and contain all necessary pump control equipment, instrumentation, flow- and pressure controls, emergency cut-off circuits, tank level indications and controls for automatic and manual fuelling operations. They also contain the programmable logical controller (PLC) system of modular design.

25. Fire Protection. Local fire protection is to be provided for each fuelling installation and normally consist of portable or mobile fire fighting equipment using foam and/or powder.

26. Cathodic Protection. A corrosion survey should normally be carried out to determine the need and the most effective method of protection (either by a sacrificial anode or impressed current cathodic protection system) for the underground pipe network within a standard JFSI, the interconnecting on-base pipeline, the feeder pipeline from the external (off-base) NATO pipeline system and the horizontal steel storage tanks. It must be assured that there is no electrical interference between the off-base and on-base pipeline networks when both are provided with separate cathodic protection systems. A cathodic protection system must be in continuous operation to ensure an effective current and voltage potential is applied to the entire structure.

27. Bonding and Grounding. JFSI's require bonding and grounding which are as follows:

a. Bonding. All mechanical metal parts, components and equipment in a fuelling system must be bonded to achieve a balanced static potential throughout the system. Normally metal flanges do not require a bonding strip as long as the flange bolts provide sufficient metallic continuity.

b. Grounding. Two different groundings exist in a fuelling installation. They are:

(1) The electrical ground applying to electrical equipment only and requires low resistance to earth, up to 25 Ohms.
(2) The static ground is only for the metallic-mechanical part of the system to ensure ready dissipation of accumulated static electricity. Values below 10000 Ohms are sufficient.

MAINTENANCE PROCEDURES AND RECORDS

28. General. Definitive written procedures for preventive and field maintenance of JFSIs are necessary for efficient, safe operation and assurance that clean-dry fuel is delivered. The preparation of written procedures is the responsibility of the technical maintenance support services. The objectives (of preventive and field maintenance) are to:

a. Prevent breakdowns.
b. Ensure proper and timely maintenance.
c. Provide immediate and adequate minor repair to avoid major repair.
d. Control maintenance cost.
e. Keep a system in operational readiness and ensure the dispensing of clean-dry fuel complying with applicable specifications.

29. Responsibility. Maintenance should normally be the responsibility of the technical support services (base engineer). It will be necessary for each country to supplement this Annex with national instructions to cater for variations of design and components in fuelling systems. It is important that the personnel operating fuelling systems maintain a close relationship with the technical support services responsible for maintaining each system.

30. Equipment Classification and Maintenance Record. Equipment should be classified and numbered according to its function in the operation of the system. The classification should correspond to the installation plan of the system and equipment components should be keyed to the plan. It is recommended that this information be incorporated in the existing maintenance record file, with each file bearing the following:

a. Name of unit and coding to system plan.
b. Manufacturer of equipment and major components.
c. Code or initial record of inspections.
d. Coded records of repairs and system modifications.
e. Equipment procured by NATO or national funds.

The type of records, forms or files to be used for preventive or field maintenance control should be established by each country concerned.

ANNEX B TO STANAG 3609
(Edition 3)

REQUIRED PREVENTIVE AND FIELD MAINTENANCE SERVICES AND INSPECTIONS

1. General Information. The following paragraphs describe the required preventive maintenance services and inspections.

2. Fuelling System Area. Preventive maintenance and safety inspections are as follows:

a. Keep system area free from fire and explosion hazards (written procedures should be developed by fire or safety group). Wipe dirt and grease from piping.

b. Keep all pits clean and dry.

c. Cut grass and weeds when necessary.

d. Check fire extinguishers for date or recharge, pressure, or supply of extinguishing agent.

e. Exercise care to prevent damage to gaskets when removing couplers, strainers, covers, fill caps, gauge covers, valves and the like. Spare gaskets must be available to ensure integrity of systems.

f. Lubricate coupling threads when necessary and check seals for tightness.

g. Inspect hydrant outlets for dents, abrasions or other damage. Dust caps must be in place.

h. Location of signs and markings should be recorded to facilitate ease of inspection. Check for condition, adequacy, possibility of deleting obsolete signs and necessity of additional signs. All signs are to conform to national standards.

3. Storage Tanks. The following steps are required to assure a safe functioning of storage tanks:

a. Check liquid level gauge to verify operational capability and accuracy by comparing stick or dip tape reading with gauge reading.

b. Check flame arrestor of pressure-vacuum vent valves for free movement and proper functioning. Remove internal mesh plug of flame arrestor and flush out with fuel and compressed clean air. Check antifreeze liquid level within the pressure and vacuum chamber.

c. Check operation of low level control switch by observing whether pumps stop when fuel level drops to the specified design minimum. Dip tank to be sure fuel level is at the height specified and adjust low level control as necessary.

d. Check operation of high level control for a safe fill-alarm.

e. Check proper functions of hydraulically operated high level control valve.

f. Check functioning of vapour or leak detection equipment.

g. Check tanks for accumulation of water and sludge. Excessive deposits of water and sludge are to be reported immediately to expedite remedial action.

h. Tank interior inspection to include: condition of internal coating; structural integrity of tank bottom and shell; condition of pump suction intakes; and condition of mechanical float of high level control valve and level indicator.

4. Pumps. All types of pumps in use require the following checks and inspections:

a. Check for corrosion on pump exterior.

b. Check for leaks around seals, vibration, noice, overheating, alignment, clearance and rotation of shaft and coupling.

c. Check operating pressure and flow rate, and compare with the initial pressure and flow data when system was new or newly upgraded.

d. Inspections are to be carried out on pump motors, motor connections, overheating and anti-condensation heaters installed in motor casings.

e. Follow manufacturer's guidelines for trouble shooting.

5. Filter/Manifold Station. The equipment installed in the filter/manifold station requires the following checks:

a. Check function of all installed equipment, strainers, filter/separators, flow meters, control valves, gate and ball valves, pressure gauges and pressure differential gauges and watch for leaks around connections and flanges during operation.

b. Simultaneously observe and record flow rate and pressure reading of filter/separator differential pressure gauge. When filter/separators are manifolded, isolate each filter/ separator when determining flow and differential pressure. Differential pressure gauge isolating cocks should remain open during normal operating procedures.

c. Filter/Separators. Whenever filter elements are replaced, the date of installation shall be recorded; elements shall be replaced when either:

(1) The differential pressure across the unit reaches the maximum recommended by the filter element manufacturer or by national regulations, normally 15 psi at issue filter/separators and 20 psi at receipt filter/separators or,

(2) After 36 months use, unless national regulations specifiy a shorter service length.

During the installation of replacement elements, they must be handled with the utmost care, since a tear or puncture of any one element will result in inefficient operation of the entire unit. Wear protection on hands to keep oils off elements and separator canisters, as this reduces water removal capability.

Personnel handling used elements must take appropriate precautions and comply with any national directives. Refilling of the filter/separator unit must be carried out at a low flow rate (approximately 5 minutes for a standard 2000 l/min filter/separator) to prevent the risk of internal explosion due to the generation of static electricity. Additional requirements and guidance for filter/separator maintenance should be taken from the manufacturer's instructions.

d. Strainers. Basket or cartridge type strainers shall be opened and cleaned when differential pressure across the unit reaches the maximum recommended by the manufacturer or national regulations. Strainers are washable and reusable.

e. Pressure Gauges. Check all pressure and differential pressure gauges for proper functioning. Check the readings (inch and metric scale) and ensure that the needle or pressure mark is in alignment, if not, re-adjust according to manufacturer's instructions. Check gauge glass for cleanliness and breakage or leakage of liquid (glycerin) in liquid filled pressure gauges.

f. Gate and Ball Valves. Inspect for easy operation, adjust packing and re-pack if necessary using aromatic fuel resistant materials.

g. Exhaust Fans. Check condition of fan wheel and clean interior of housing; check for excessive vibration and overheating; and check explosion-proof motor connection for condition and tightness. Remove all rust deposits on fan and housing and re-paint if necessary.

6. Dispensing Points for Trucks, Aircraft Hydrants and Hot Refuelling Pits. Installed equipment must be kept free of leaks and checked as follows:

a. Check functioning of installed equipment and watch for leaks around connections and flanges. Observe and record flow rates and pressures, compare with the design data of the facility.

b. Check "dead-man" control hose for nicks, cuts and leaks on handle. Check handle for cracks.

c. Check grounding wire for continuity, loose connection, fraying and insulation; replace if necessary.

d. Inspect nozzle for excessive wear and cracks around collar and seal; repair or replace as required.

7. Mechanical Loading Arms (Pantographs) for Truck and Aircraft Refuelling. Mechanical loading arms require minimum maintenance, which is as follows:

a. Fixed mounted, bottom loading type pantographs, normally made of stainless steel, have a maintenance advantage due to non-lubricated type swivel joints.

b. Check overall electrical continuity between the connecting flange and refuelling nozzle (not to exceed 1000 Ohms resistance).

c. On detachable type pantographs the zerk fitting of the casters needs to be lubricated periodically. The surface wheels should be inspected for wear and abrasion.

d. Follow manufacturer's inspection manual for equipment component repairs.

8. Flexible Rubber Hoses for Truck and Aircraft Refuelling. Ensure that the hoses are free from oil and grease and that protective end caps are fitted and in position. Hoses must be stowed correctly on racks or hangers and protected from sunlight. Perform the following checks:

a. Test hoses hydrostatically at 1 1/2 times dead head (shut-off head) pressure of system.

b. Check for nicks, cuts and scuffs on the hose surface and aging of the material.

c. Lubricate ball bearing type swivel joints to ensure easy operation.

9. Automatic Control Valves. Perform the following maintenance on control valves specified under paragraph 15 of Annex A:

a. Check control valves during operation for proper functioning in accordance with commissioning data.

b. Check for leaks around the control tubing connections and retighten, if necessary.

c. In the event of malfunction, check manufacturer's instructions for corrective action.

10. Pipeline Systems. Perform the following maintenance on the pipeline systems:

a. Patrol pipeline systems (and off-base connecting lines) with linewalkers and/or vehicles. Right-of-way should be kept free of overgrowth; encroachment of any nature should be reported.

b. Perform pressure check at 1 1/2 times the normal working pressure for a minimum of 24 hours or at the maximum working pressure laid down for the system.

11. Off-shore Unloading Facilities. Maintenance of tanker off-loading facilities require specially trained personnel and divers. The inspections should be performed as follows:

a. Inspect navigation aids and mooring buoys, in accordance with national standards and regulations, for evidence of damage and possible movement or dragging by vessels, current or winds. Mark wrecks or other navigational hazards and initiate action for their removal.

b. Inspect submarine pipelines and their seaward end for tell-tale oil or gasoline slicks indicating leakage from pipes or tanker unloading hose.

c. Inspect and, if necessary, repair or replace all mooring hawsers or lines, deck hose, chain, chair stoppers, flange adaptors, gaskets or other deck gear used in mooring the tanker and in connecting tanker unloading hoses to the side of the tanker or to the tanker's manifold.

d. Divers should inspect tanker unloading hoses, navigational and mooring buoys and their mooring chains, shackles and anchors for signs of incipient failure or indications of rapid wear of parts subject to wave motion or abrasion on the ocean floor.

e. Hydrostatically test, in accordance with applicable regulations, the entire unloading system to 1 1/2 times normal working pressure or the maximum working pressure laid down for the system.

12. Marine Dock (Piers, Wharves or Quays Equipped with a Tanker Unloading System). The marine dock should be maintained as follows:

a. Inspect pipelines, valves and dock hoses for signs of damage or deterioration. Perform maintenance or repair as required.

b. Inspect all mooring lines, cleats, bollards, bitts, pulley blocks, steel wire ropes, winches, etc. and repair or replace as required.

c. Inspect dock for signs of any serious damage as soon as tanker leaves. Initiate repairs required as quickly as possible.

d. Hydrostatically test, in accordance with applicable regulations, the dock piping system to 1 1/2 times normal working pressure or the maximum working pressure laid down for the system.

13. Electrical Systems. Electrical systems, including all safety circuits and emergency switches, should be inspected and maintained in accordance with the manufacturer's guidelines and instructions. In order to ensure safe operation of the facilities a number of items should be checked as follows:

a. Observe function of the pump flow control by energizing the pump; if there is no flow, pump should stay on line for approximately 45 to 60 seconds and then cut off automatically.

b. Check all equipment indicator lights on control panel; replace any burned out bulbs.

c. Test the main panel emergency switch when emergency button is energized, all control systems should be off with the exception of the normal in- and outdoor lighting system.

d. Check for proper functioning all emergency stop switches in pump houses, filter/-separator rooms and outdoor locations.

e. Check all sensing, alarm and control functions.

f. Check all exposed wiring, conduits and fuse boxes.

g. Check the interior of power-switch gear panels and control panels and remove dust, moisture, and corrosion from contacts.

h. Bonding and grounding: Inspect the ground cable connection points, wires and clips and replace cable immediately if insulation is damaged or broken. Measure the low-ohm resistance of the cable with a "high-ohm resistivity" meter to ensure adequate conductivity between the grounding connection and the cable clip.

14. Cathodic Protection System. Proper function of cathodic protection systems can only be assured when the following inspections and surveys are performed:

a. Check power source to ensure uninterrupted operation and record power consumption.

b. Clean rectifier area and check inside of rectifier cabinet for any debris (birdnest debris is very common) which could cause malfunction of rectifier.

c. Perform cathodic protection potential measurement survey, including the rectifier in- and output readings, and keep records of all readings obtained. Compare with previous recorded measurement survey to determine the effectiveness of the cathodic protection system.

15. Environmental Protection. Perform the following maintenance services to protect the environment in and around JFSI's:

a. Check fuel/water separators (oil interceptors) for operation and inspect internal float switch mechanism for proper functioning.

b. If fuel/water separator contains excessive liquid (fuel or water) containing sludge and debris, take action for removal in accordance with national environmental laws and inspect internal float switch mechanism for proper functioning.

c. Inspect epoxy paint surfaces in pits, pumphouses and filter/manifold station for cracks and peeling. If necessary, repair by patching and recoating the damaged surface areas with fuel resistant material and epoxy paint.

d. Inspect concrete pads at refueller dispensing points for cracks and repair as necessary.

e. Water bottoms from drain tanks (fuel recovery tanks) shall be removed in accordance with national environmental laws.

16. Standby-Generator. Diesel generators should be maintained as follows:

a. Ensure that the daytank has sufficient fuel for operation of the generator.

b. Perform inspection and maintenance services in accordance with manufacturer's instructions.

ANNEX C TO STANAG 3609
(Edition 3)

GUIDANCE FOR FREQUENCY OF PERIODIC INSPECTIONS AND MAINTENANCE SERVICES

1. The frequencies listed below are considered minimum requirements. However, national guidelines or special characteristics of installed equipment may require more or less frequent maintenance services. The following abbreviations are used:

D – Daily
W – Weekly
M – Monthly
Q – Quarterly
S – Semi-Annually
A – Annually
AR – As Required

2. Fuelling System Area.

a. Inspect for fire hazards.

D – Systems in daily operation.
M – Systems used monthly.
Q – For dormant systems (standby systems not in use).

b. Keep all pits clean and dry.

W – Systems in daily operation.
M – Systems used monthly.
Q – For dormant systems.

c. Cut grass and weeds regulary in the growing season.

d. Inspect fire extinguishers or other installed fire fighting equipment.

M – or as required by national laws.

3. Storage Tanks.

a. Check function of liquid level gauge.

S – For tanks in daily use.
A – For dormant tanks.

b. Check pressure vacuum vent valves and flame arrestors.

S – For tanks, all uses.

c. Check function of low level control and high level alarm of automatic level indicator; check operation (open and close) of hydraulically operated high level control valves.

Q - For tanks in daily operation.
A - For tanks used quarterly.

d. Check function of vapour or leak detection equipment.

Q - For daily used tanks.
A - For dormant tanks.

e. Inspect tanks in accordance with the table below. Guidelines for entry and inspection, cleaning and repair of aviation fuel storage tanks are contained in Annex D.

Tank Inspection Frequency
(maximum interval between cleaning)

Tank Type	Tank Interior Uncoated		Tank Interior Coated	
	Without inlet filter/ separator	With inlet filter/ separator	Without inlet filter/ separator	With inlet filter/ separator
Operating Tanks (i.e. tanks which directly serve refuelling vehicles or hydrant systems)	3 years	5 years	5 years	8 years 5 years **
Bulk Storage or buffer tanks	4 years	6 years * 5 years **	6 years 5 years **	8 years 5 years **
Bulk Storage (barge or tanker delivery)	3 years	5 years *	5 years	8 years 5 years **
Drain Tanks (fuel recovery tank)	normally inspected and cleaned concurrently with the inspection/cleaning of operating storage tank			

* If a filter/separator or micromic filter is installed in the receipt system
** Recommend tanks be inspected every 5 years to check the mechanical integrity of the interior and components, although the cleanliness requirement for inspections would have a longer extented time period (as indicated above)

Note: Newly constructed tanks should be inspected after one year of initial filling to check the condition of the interior coating, an item still under warranty.

4. Pumps.

a. Check for corrosion on pump-motor unit.

Q - For units in daily or monthly use.
A - For dormant systems.

b. Check for leaks, vibration, noise, overheating, alignment, clearance and rotation of shaft and coupling.

W - For pumps in daily use.
M - For pumps used monthly.
A - For dormant systems.

c. Check operating pressure and flow rate.

Q - For pumps in daily or monthly use.
A - For dormant systems.

d. Pump motor: check connections, check for overheating, check anti-condensation heaters in motor casings (if installed), check explosion-proof controls.

M - For units in daily or monthly use.
A - For dormant systems.

5. Filter/Manifold Station.

a. Check functions of all installed equipment and watch for leaks; record flow rate and differential pressure readings of filter/separators.

M - For systems in daily use.
Q - For systems used monthly.
A - For dormant systems.

b. Filter/separator element replacement: frequency for first and second stage elements; if second stage consists of a single permanent strainer or a number of reusable cartridges, it should be inspected and cleaned concurrently with the replacement of the first stage coalescer elements.

AR - By national regulations and/or
- when differential pressure has reached the maximum limit, normally 15 psi
- or after 36 months in use.

c. Check and clean basket strainers.

AR - By national regulations or
- if strainer is provided with a differential pressure gauge, it should be cleaned when differential pressure has reached the recommended maximum.

d. Check all installed manual valves and exhaust fans.

Q - For systems in daily or monthly use.
A - For dormant systems.

e. Check overpressure control valve for proper functioning.

M - For systems in daily use.
Q - For systems used quarterly.
A - For dormant systems.

6. Dispensing Points for Trucks and Aircraft Fuelling. Check functions of all installed equipment, watch for leaks and record operational flow and pressure ratings; check "dead-man" control hose; check grounding wire and inspect nozzle for wear and tear.

M - For systems in daily use.
S - For systems used quarterly.
A - For dormant systems.

7. Mechanical Loading Arms (Pantographs) for Trucks and Aircraft Fuelling.

a. Check function and easy movement of fixed pantograph; check nozzle and inspect swivel joints for leakproof tightness.

Q - For systems in daily or monthly use.
A - For dormant systems.

b. Check detachable pantographs for easy mobility and proper functioning of all components; inspect swivel joints, automatic pressure equalizing chambers, venting and draining valves, sampling device, pressure gauge, locking device (breaks), dry-break shut-off, hydrant coupler and fuelling nozzle.

M - For systems in daily use.
Q - For systems used monthly.
A - For dormant systems.

c. Perform conductivity test for fixed and detachable type pantographs and inspect grounding wire for continuity.

S - For all pantographs in use.
AR - For pantographs not in use, however prior to each reactivation of a system.

8. Flexible Rubber Hoses for Truck and Aircraft Fuelling.

a. Check for nicks, cuts and scuffs on hose surface and aging of material. If nicks, cuts or scuffs are noted, the hose must be pressure tested before use to prevent a fuel spill.

Q - For all uses.

b. Lubricate ball bearing type swivel joints.

A - For daily or quarterly use.

c. Hydrostatic pressure test at 1 1/2 times dead head (shut-off head) pressure of system

S - For daily or monthly use.

9. Automatic Control Valves.

a. Check all installed control valves during operation for proper functioning; check for fuel leaks, tightness of all connections for pilot controls; check opening/closing of valves at indicator stem; this is also an indication of proper diaphragm operation.

Q - For daily or monthly use.
A - For dormant systems.

b. Check electric solenoid control (if used) for proper functioning.

A - For daily or quarterly use.

10. Pipeline System.

a. Patrol pipelines (and any off-base connecting lines) and check for leak indications (at waterways, ditches, brown patches of vegetation).

M - For all underground pipelines.

b. Perform pipeline pressure test.

A - For all underground pipelines.

c. Inspection and testing of exposed piping systems.

W - Check operational system for apparent leakage under operating pressure.
Q - Check dormant systems for apparent leakage under pressure.
Q - Inspect for corrosion control and necessity for rectification action.
Q - Inspect marking and identification.
A - Inspect bonding/grounding.
A - Perform system pressure test.
AR - Lubricate couplings and threads; replace gaskets and seals when leaking.

11. Off-Shore Unloading Facilities.

Q - Inspect navigation aids and mooring buoys, check route of submarine pipeline and seaward end for tell-tale fuel slick.
A - Perform pipeline pressure test.
AR - Diver should inspect tanker unloading hoses, mooring chains, shackles and anchors concurrently with tanker unloading operation.

12. Marine Docks (Piers, Wharves or Quays) Equipped with Tanker Unloading Equipment.

Q - Inspect pipeline, valves and dock hoses, check mooring lines, cleats, bollards, bitts, pulley blocks, steel wire ropes and winches.
A - Perform pipeline pressure test.

13. Electrical Systems.

a. Observe function of pump flow control, check control panel, test emergency switches on the main panel, check all emergency stop switches in the fuelling system area, check sensing, alarm and controls, check exposed wiring, conduits and fuse boxes.

Q - For systems in daily or monthly use.
A - For dormant systems.

b. Inspect bonding and grounding for proper conductivity.

M - For systems in daily use.
Q - For systems used monthly.
A - For dormant systems.

14. Cathodic Protection System.

M - Check power source for uninterrupted operation.
Q - Inspect rectifier inside for any debris and compare the rectifier output (volts and amps) with the previously recorded readings.
A - Perform potential measurement survey.

15. Environmental Protection.

a. Check fuel/water separators (oil interceptors) for presence of fuel; find out where it comes from and remove by proper means.

W - For systems in daily use.
Q - For systems used monthly.
A - For dormant systems.

Note: After heavy rain storms check fuel/water separator for proper functioning since there could be a problem of clogging from debris.

b. Inspect epoxy paint surface area in pits, pumphouses and filter/manifold stations, check concrete pads at refueller fillstands.

Q - For systems in daily use.
A - For dormant systems.

16. Stand-by Diesel Generator.

a. Operate generator for approximately one hour under load condition.

Q - For systems in daily or monthly use.
A - For dormant systems.

b. Perform inspection services as specified in the manufacturer's instructions.

ANNEX D TO STANAG 3609
(Edition 3)

GUIDANCE FOR ENTRY, INSPECTION, CLEANING AND REPAIR OF JET FUEL STORAGE TANKS

GENERAL

1. The common fuels used for NATO tactical and wide body aircraft are jet fuel types F-34 (JP-8) and F-44 (JP-5) for NAVY aircraft based on aircraft carriers. In rare cases F-40 (JP-4) is used.

2. For those NATO countries storing jet fuel in tanks which have previously been used for storage of leaded aviation gasoline or which are still used for leaded aviation gasoline, see paragraphs 20 to 22 at the end of this Annex for special safety precautions when tank entry or cleaning is required.

3. The majority of on-base jet fuel storage tanks are provided with total internal coating (bottom, wall and roof). Furthermore, normal standard vertical tanks have a 5% sloped tank bottom to the center sump. The tank entry, inspection and cleaning of such coated tanks is much simpler and safer, and requires much less manpower and equipment, in comparison with the "old-rusty" flat bottom type. Therefore, the technical guidance described in this Annex is based on standard storage tank design used since the early 1980's.

RESPONSIBILITY

4. Tank cleaning responsibilities are vested in national technical maintenance support organizations.

5. Tank cleaning operations must be coordinated between the various base organizations such as system operators and maintenance crews, the fuel quality control section, ground safety, fire protection and environmental health personnel.

PERSONNEL SAFETY EQUIPMENT AND TANK CLEANING EQUIPMENT

6. Because the health and safety laws of each NATO nation varies the equipment required for personnel entry and tank cleaning could also vary. A list of recommended minimum equipment for tank entry and tank cleaning is as follows:

a. Personnel Safety Equipment. Personnel safety equipment should consist of:

(1) Breathing air trailer, positive pressure type respirator;
(2) Overalls made of cotton, soft overshoes with embedded grit soles; fireman boots;
(3) Ear protection, cotton hood (surgical type);
(4) Fuel resistant gloves, wristlet and safety harness with ropes;
(5) First aid kit;
(6) Tripod assembly.

b. Tank Cleaning Equipment. Tank cleaning equipment should consist of:

(1) Eductor type air blower unit, either explosion-proof type or air power driven pump;
(2) Compressor;
(3) Squeegees, mops, rags, scoop, rubber type dust pan and buckets;
(4) Portable electric explosion-proof lighting; approved battery operated lights;
(5) Grounding wire, warning signs;
(6) Vapour-oxygen meter, multimeter (Ohm-tester).

PREPARATION FOR TANK ENTRY

7. Top-Mounted Pumps. Fuel shall be pumped out and transferred to another storage tank until the low level device cuts off the installed fuelling pump. Then minimum 1 should be deactivated by the over-ride switch and the fuelling pump manually started to pump the remaining fuel out of the tank until the minimum 2 or the flow switch again stops the pump. The remainder of fuel on the tank bottom shall be removed by the sump pump (in the center sump) into the drain tank (which must be empty at the beginning of the operation), until the flow switch stops the sump pump.
Caution: Continually monitor drain tank during this operation to ensure tank does not overflow. Depending on tank size several fillings/pump-out cycles of the drain tank may be required until all fuel has been removed.

8. Side-Entry Pumps. Most fuel shall be pumped out and transferred to another storage tank until the low level device or a flow switch cuts off the pump. The remaining fuel shall be pumped out through the center (or side) low sump piping, using an installed pump or a temporary pump, depending on the tank design.

9. The tank being inspected/cleaned shall be isolated from the remainder of the facility to preclude accidental fuel penetration; closure of valves in the connecting lines to the tank is not sufficient. To ensure positive isolation, the connecting lines are to be disconnected from the tank and blanked off.

10. The tank area should be roped off in order to prevent entry by unauthorized personnel during the cleaning process.

11. All tank dome manway covers must be removed to enable access to the tank. One man-hole is to be used to install the tank ventilation equipment and the second for the entrance/ exist of personnel (a third one could be used to expedite removal of vapours and give more natural light).
WARNING: If the tank manhole diameter is smaller than 800 mm (32"), personnel shall, under no circumstance, enter the tank with breathing apparatus, because, in case of an accident inside the tank, it will be impossible to pull the troubled person through such a small manhole. For older tanks with 600 mm (24") diameter manholes, nations should develop procedures for cleaning without tank entry by personnel.
Standardized NATO fuel storage tanks normally have 1000 mm (40") diameter manholes to assure safe entry and exit for cleaning personnel.

12. To free a tank from vapour portable ventilation equipment should be employed; extend the suction hose (duct) through the manhole to within approximately 100 mm (4") of the tank floor and start the ventilation. Initially test the atmosphere in the tank through the manhole with a calibrated vapour indicator.

13. Tank cleaning and repairs should be performed by personnel having proper respiratory equipment. If the tank has a benzene level below 1 ppm and the oxygen level is above 19 percent, then entry without respiratory equipment is acceptable.

CLEANING AND INSPECTION OF TANKS

14. Cleaning and inspection of tanks should be performed by a five man team as follows:

a. Two men inside the tank for cleaning.
b. One man as supervisor/observer at the manhole, also serving as standby, fully suited for rescue in case someone inside the tank is in trouble.
c. One man operating compressor, blower and breathing air trailer.
d. One man (runner) to handle movement (in/out of tank) of cleaning equipment (squeegees, mops, rags buckets, etc).

15. As indicated in paragraph 13 above cleaning may be performed without respirator equipment. However, this would require one man taking continuous vapour/oxygen readings inside the tank while the tank floor is cleaned. Normally an experienced tank cleaning crew, with modern safety equipment, prefers to wear the full safety gear and mask while the tank floor is cleaned. Monitoring of the tank atmosphere should be carried out at appropriate intervals to ensure that the conditions required for entry are maintained.

16. Vapour removal from a standard 1250 m^3 storage tank with an adequate size ventilator should not take more than 24 - 36 hours. Cleaning personnel should enter the tank while the floor is still wet, since this will simplify the clean-up and removal of slime, a fine sediment which is a combination of fuel additives, water and fuel. If the tank floor is dry, it is difficult to remove the sediment. Utilization of squeegees and mops will expedite clean-up of the floor without damage to the coated surfaces. If the slimy residue is too thick, use either fuel or water for clean-up and mop it to the center sump. From there it can be pumped out by the center sump pump either into the drain tank or with a portable pump directly into metal barrels or containers.

17. Tank coating inspection shall be performed upon completion of the cleaning process. In order to perform a thorough inspection of the coated surfaces (tank floor and wall) sufficient portable explosion-proof lighting should be installed to provide adequate lighting. Small cracks, blistering or peeling of the coated surface area should be repaired by the tank cleaning crew using commercially recommended repair kits. If the number of cracks and peelings is too large, the supervisor should decide whether or not the tank should remain out of operation while the damaged areas are repaired by a specialized coating contractor.

18. Lastly inspect all equipment inside the tank for wear or unusual deformation. Then remove all temporary equipment and cleaning tools from the tank. The tank cleaning supervisor shall perform the last inspection (walk-thru) inside the tank to ensure it is ready for refilling with fuel. When there is no further need for entry to the tank, reinstall fill line valves and/or remove blind flanges. The gasket of the tank manhole covers shall be replaced. Upon closure of all manholes, stencil on one cover (manhole with ladder) the date and year of the tank cleaning with name of contractor or in-house crew.

CLEAN-UP AND DISPOSAL OF WASTE

19. Dispose of waste material, slime, sediment and any contaminated fuel (from the sump area) and water bottoms, in accordance with the instructions from the environmental coordinator.

SPECIAL SAFETY PRECAUTIONS FOR CLEANING OF LEADED AVIATION GASOLINE TANKS

20. Nations are responsible for laying down clear instructions for handling tanks currently used for storing leaded aviation gasoline or having previously been in use with such a product. This is because the tank bottom residue will contain quantities of toxic lead compound, regardless, if the tank is vapour-free or not.

21. The Associated Octel Co Ltd publishes a booklet in a number of languages which provides a clear guide to enable nations to produce instructions for maintenance and operating personnel. The cleaning of tanks that have contained leaded gasoline presents special problems and is hazardous throughout the entire cleaning process.

22. The tank cleaning crew must use the full safety gear, clothing and respirator equipment during the entire cleaning process regardless of low vapour readings in the tank, because the volatile lead compounds in the sludge are toxid and a source of danger when inhaled or absorbed through the skin.

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

NATION	NATIONAL RATIFICATION REFERENCE DE LA RATIFICATION NATIONALE	NATIONAL IMPLEMENTING DOCUMENT NATIONAL DE MISE EN APPLICATION	IMPLEMENTATION/MISE EN APPLICATION					
			FORECAST DATE PREVUE			ACTUAL DATE REELLE		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE*	VS3 MAS-96-062236 of/du 6.5.96	STANAG					1.97	1.97
CA	2441-3609/DAS Eng 3-4) of/du 21.10.93	CFTO C-98-15F-003/MS-022					3.94	
DA*	MA 204.68-S3609/MAM3-05575 of/du 23.3.94	STANAG				1.95	1.95	1.95
FR								
GE	BMVg-Fü S IV 2 Az 03-51-40 of/du 5.10.94	See overleaf/ voir au verso				9.94	9.94	9.94
GR	F.060/184500/HAFGS/D2/3 of/du 10.3.94	STANAG				6.94	12.94	6.94
IT	SMA/442/07530/3609 of/du 10.12.93	STANAG				12.93	12.93	12.93
LU	NOT PARTICIPATING/ NE PARTICIPE PAS							
NL*	NW 94021644 of/du 22.3.94	RNLAF/RNLAR: STANAG RNLNA: MLD-06-5-1				6.94	6.94	6.94
NO*	MAS/01081/95/LST Plan 1/JT of/du 5.12.95	STANAG						
PO	RRN 016/94/DD of/du 24.2.94	STANAG						9.94
SP	NOROPE 058/3609/031D of/du 20.6.94	STANAG				10.94	10.94	10.94
TU	GN.P.P:2307-48-94/AND.D of/du 12.1.94	ARMY: K.K.LOJ-I-1 NAVY: DENSTANEM 712				9.94	9.94	
UK	D/DOR(JS)/332/609/NMST of/du 20.12.93	JSP 317				9.94	9.94	9.94
US	SA-ALC/SFT of/du 22.1.94	Mil Hdbk 1022				5.96	5.96	5.96

See overleaf reservations(*)/comments (+)
Voir au verso réserves (*)/commentaires (+)

RESERVATIONS

BE: AIR/ARMY: only for new constructions.

DA: Denmark reserves the right to exclude the installation of a Pump Discharge Control Valve, and to apply the contents of this STANAG only to future installations or major modifications of JFSI.

NO: Norway reserves the right to exclude the installation of a Pump Discharge Control Valve, and to apply the contents of this STANAG only to future installations or major modifications of JFSI.

NL: Para. 4.h. The RNLAF identify systems by use of national markings.

RESERVES

BE: AIR/TERRE: uniquement pour les nouvelles constructions.

DA: Le Danemark se réserve le droit de ne pas installer de vanne de contrôle de débit de pompe et de n'appliquer les stipulations de ce STANAG qu'aux futures installations ou lors de modifications importantes des JFSI.

NO: La Norvège se réserve le droit de ne pas installer de vanne de contrôle de débit de pompe et de n'appliquer les stipulations de ce STANAG qu'aux futures installations ou lors de modifications importantes des JFSI.

NL: Alinéa 4.h. La RNLAF définit les systèmes par l'utilisation de marques nationales.

NATIONAL IMPLEMENTING DOCUMENTS/ DOCUMENTS NATIONAUX DE MISE EN APPLICATION

GE: STANAG will be incorporated into "Handbuch für die Instandsetzung von Flugfeldtankanlagen der Bundeswehr".